

Application of biological treatment to rendered “fines” from the meat industry to obtain new hydrolysed products of high quality and nutritional value.

Summary

Every year the meat industry generates significant quantities of offal from animals (by-products and solid and liquid waste) which have to be managed appropriately based on their origin and the potential risk of transmitting pathogens and toxic substances which can adversely affect public health, animal health and the environment.

The main sources of offal classified into three categories (animal by-products not intended for human consumption C1, C2, and C3) are farm-killed animals, slaughterhouse waste and waste from meat processing for human consumption. To be recovered, animal by-products not intended for human consumption are transformed into by-products such as meat-and-bone meal and animal fats. Depending on the category of animal by-products not intended for human consumption, the by-products may then be used for producing energy, chemical, medicinal or pharmaceutical compounds, or for animal feed and fertilisation. Meat-and-bone meal also has variable animal protein content depending on its origin. This variability leads to a loss of biological nutritional value, and in particular to:

- Greater allergic response due to the presence of a higher proportion of poorly digestible proteins.
- Varying ash content which directly influences the protein content.
- Decreased bioavailability of nutrients.

At present there are a number of industrial processes for processing and recovering as much as possible of animal by-products not intended for human consumption. Rendering is the most widely used of these processes to treat meat by-products. Nonetheless, some of the main rendering problems which SUBPRODUCTOS CÁRNICOS ECHEVARRIA Y ASOCIADOS, S.L., and the other companies in its industry are facing are:

- Loss of the biological nutritional value of their animal meal depending on the type of material of origin (meat/bone ratio in animal by-products not intended for human consumption), and the treatment conditions used.
- Economically and environmentally acceptable recovery of processing residues such as fines.

These issues lead to more limited use of the meal, which for the company means a restriction of its market and a fall in the economic value of the meal produced, coupled with squandering a valuable source of protein in the fines.

Against this background, it is essential to optimise processing based on hydrolysis reactions which will make it possible to:

- Recover the fines and leverage their high protein content.
- Get a new hydrolysed product with a high proportion of low molecular weight peptides and applicable in animal feed and fertilisation.

Objectives

The overarching objective of this project is to obtain hydrolysed products for the agro-industrial sector derived from processing under mild conditions of the protein contained in the fines generated during the rendering process of animal by-products not intended for human consumption in categories C2 and C3. The specific objectives to achieve this main objective are as follows:

- In a first stage, chemically characterise the fines from category C2 and C3 animal by-products not intended for human consumption in order to determine their protein content.
- Fine-tune the defatting and hydrolysis conditions to achieve the highest degree of hydrolysis of the protein contained in the fines.
- Characterise the hydrolysed products obtained based on the type of animal by-products not intended for human consumption and conditions applied.
- Evaluate the effect of various enzymes on the degree of hydrolysis and molecular weight of the hydrolysed products.
- Determine the amino acid profile of the hydrolysed products with a higher proportion of low molecular weight peptides.
- Optimise and validate on a pilot scale the enzymatic hydrolysis process to get hydrolysate with a high proportion of low molecular weight peptides.

Description of the actions planned in the project

The measures envisaged in this project can be summarised in five actions:

- I. Chemical characterisation of the fines by their origin.
- II. Tailoring the conditions of the enzymatic hydrolysis process to the various types of fines.
- III. Chemical characterisation of the products of the enzymatic hydrolysis process.
- IV. Pilot optimisation and validation of the enzymatic hydrolysis process.
- V. Dissemination of the project's results.

Expected results and practical recommendations

The expected results in this project can be summarised as follows:

- Characterisation of samples of fines from different types of animal by-products not intended for human consumption in order to select the most suitable ones taking into account the trials and tests to be conducted and to ensure the uniformity and representativeness of the results.
- Obtaining samples of partially defatted fines in order to adapt the enzymatic hydrolysis conditions.
- Choosing optimal hydrolysis conditions (type of enzymes and reaction time) to achieve the highest degree of hydrolysis.
- Optimising and validating the hydrolysis process to ensure robust, representative and scalable results.
- Complete analysis of the characteristics of the hydrolysed proteins to determine the effects of the process on their solubility, molecular weight and amino acid profile.
- Improved knowledge about the behaviour of the enzymes used to carry out the hydrolysis reactions according to the chemical composition of the fines and their origin.
- Have a technically and economically sustainable alternative method for recovery of the fines generated during processing of animal by-products not intended for human consumption to obtain products of high nutritional value for the agro-industrial sector.
- Deliver effective transfer of the knowledge and results of this operational group (this action is described in the relevant section of the dissemination plan).

Operational Group Leader**ORGANISATION:** SUBPRODUCTOS CÁRNICOS ECHEVARRÍA Y ASOCIADOS, S.L.**Operational Group Coordinator****ORGANISATION:** SUBPRODUCTOS CÁRNICOS ECHEVARRÍA Y ASOCIADOS, S.L.**Other Operational Group members (not aid recipients)****ORGANISATION:** CENTRE DE DESENVOLUPAMENTS BIOTECNOLÒGICS I AGROALIMENTARIS (dbA)**ORGANISATION:** COPECINTER, S.A.**ORGANISATION:** ASOCIACIÓN NACIONAL DE INDUSTRIAS TRANSFORMADORAS DE GRASAS Y SUBPRODUCTOS ANIMALES (ANAGRASA)**Subject area(s) of application**

- Agricultural production system
- Agricultural practice
- Agricultural equipment and machinery
- Livestock farming and animal welfare
- Vegetable production and horticulture
- Landscape / Territorial management
- Pest and disease control
- Fertilisation and nutrient management
- Soil management
- Genetic resources
- Forestry
- Water management
- Climate and climate change
- Energy management
- Waste and by-product management
- Biodiversity and environmental management
- Food quality/processing and nutrition
- Supply chain, marketing and consumption
- Competitiveness and agricultural and forestry diversification
- General

Geographical area(s) of application

PROVINCE(S)	COUNTY(IES)
LLEIDA / CERVERA	SEGRÌÀ / SEGARRA

Project dissemination (publications, conferences, multimedia, etc.)

All members of this OG will perform communication and dissemination tasks including:

- Taking part in sector briefing events.
- Drawing up information sheets.
- Posting project progress on social media and/or websites.
- Publication of scientific and technical articles by the dbA.

Project website

There is no project website at present.

Other project information

PROJECT DATES	TOTAL BUDGET
Start date: July 2021	Total budget: €248,887.44
	DACC funding: €113,492.67
Current status: In progress	EU funding: €85,617.28
	Own funding: €49,777.49

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